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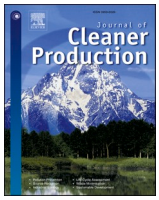

From motivation to implementation: A firm-level model of customer-oriented green actions

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ABSTRACT

The integration of sustainability into business operations increasingly requires firms to align environmental strategies with customer value. This study examines how external and internal motivations influence the implementation of customer-oriented green actions through four core firm-specific practices: environmental management systems (EMS), sustainable supplier selection, product eco-design, and green human resource management (HRM). We propose a moderated mediation model to explore how different types of motivation influence green action enactment, both directly and indirectly through internal capabilities. The model is empirically tested using structural equation modeling (SEM) on a large cross-sectoral sample of 879 Italian firms. Results show that external motivations have a more substantial impact on eco-design and HRM, whereas internal motivations have a more significant influence on EMS and supplier selection. All four practices significantly enhance customer-oriented green actions, with supplier selection being the most impactful. The moderating role of firm size reveals that eco-design is more relevant for smaller firms, while HRM plays a stronger role in larger organizations. This study contributes to the environmental management literature by providing an integrated view of how motivational drivers and firm-level practices interact to promote sustainability-oriented customer engagement. The findings offer actionable insights for managers, particularly in aligning sustainability practices with customer-facing value creation, and for policymakers aiming to design targeted incentives that support sustainable transformation across various firm types and sizes.

1. Introduction

In recent years, scholars have increasingly examined the drivers that lead firms to adopt green practices, particularly those aimed at consumers (Ahmad and Zhang, 2020; Mehraj et al., 2023). While previous studies have acknowledged that cross-cutting technologies and marketing capabilities play a role, they emphasize the importance of creating superior customer value through a rethinking of business processes and operations (Ioannou et al., 2023; Isac et al., 2025). The growing awareness of environmental responsibilities, coupled with the increasing trend of green purchasing, has stimulated demand for more sustainable products (Sharma et al., 2023).

While previous studies have acknowledged that cross-cutting technologies and marketing capabilities play a role, they emphasize the importance of creating superior customer value through a rethinking of business processes and operations (Bocken et al., 2013). Key elements identified as crucial for generating and transferring environmental value to customers include Environmental Management Systems (Heras-Saizarbitoria et al., 2016; Prieto-Sandoval et al., 2019), supply chain optimization (Liao, 2023; Caniëls et al., 2013), human resource management (HRM) (Camilleri, 2022; Tahir et al., 2024), and technological product innovation (García-Sánchez et al., 2020; Wang et al., 2021).

While prior studies have examined environmental management systems, supplier selection, eco-design, and green HRM individually, there is limited understanding of their combined mediating role between motivational drivers and customer-oriented green actions (Rubel et al., 2021; Freitas et al., 2020; Longoni and Cagliano, 2016; Rennings, 2000). Moreover, the literature has not sufficiently addressed how these relationships may vary by firm size, despite its recognized importance for

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managerial capacity and the adoption of sustainability. Addressing these gaps, our study develops and empirically tests a moderated mediation model that integrates both internal and external motivations with firm-specific practices, offering a more comprehensive explanation of how companies enact sustainability strategies that create customer value. We ground this model in an integrated theoretical framework that combines the Resource-Based View (RBV), Resource Dependence Theory (RDT), and the Dynamic Capabilities (DC) perspective, thereby linking motivational drivers to firm-level capabilities and, ultimately, to customer-oriented green actions.

This research contributes to the ongoing debate by examining the interplay between market demand and firm-specific factors that drive customer-oriented green actions. We develop a conceptual model grounded in existing literature and informed by the RBV, RDT, and the DC perspective, to assess and compare the relative strength of relationships between various motivations and their influencing or moderating variables. The firm-specific factors analyzed include the environmental management system, supplier selection criteria, product design, and HRM. Within this framework, environmental management systems, supplier selection, product eco-design, and HRM are conceptualized as dynamic capabilities that reconfigure and deploy firm resources in response to external regulatory, market, and stakeholder pressures. Firm size is considered a moderator in the relationship between these factors and customer-oriented green actions (Rahman et al., 2020).

Recognizing the need for high-quality data at national or regional levels to assess firms' green performance, we employ data from a 2020 survey of 879 Italian firms. The dataset's strong reliability and validity enable us to test the conceptual model using structural equation modeling. By treating firm size as a moderator, this study also addresses calls for deeper investigation of its role in the implementation of customer-oriented green strategies (Drempetic et al., 2020; Heras-Saizarbitoria et al., 2016).

This study makes several contributions. First, it examines the impact of both external and internal drivers, including regulatory pressure, access to incentives, and the potential for green-related profits, as well as organizational values and employee beliefs. These include the ethical sensitivity of top management, green awareness when entering new markets, commitment to corporate reputation, efforts to enhance supply chain sustainability, and sensitivity to waste reduction. Second, it examines the combined effects of Environmental Management Systems, supply chain operations, product design processes, and HRM in promoting customer-oriented green actions. Third, by highlighting the role of HRM, the study emphasizes the importance of fostering a culture that is sustainability-oriented and empowering employees to engage in environmentally responsible behavior.

The paper is structured as follows: Section 2 outlines the theoretical background, the integrated RBV, RDT, and DC framework, the conceptual framework, and hypotheses, including the proposed model of moderated mediation. Section 3 details the sample selection and methodology. Section 4 presents the empirical findings, followed by the conclusions in Section 5. Section 6 discusses study limitations and future research directions.

2. Theoretical background

Creating superior customer value through sustainability requires marketing strategies to be embedded within the company's broader strategy, rather than being treated as standalone claims (Laukkanen and Tura, 2022). This integration necessitates reconfiguring firm-specific factors and aligning internal capabilities with external stakeholder expectations (Tapaninaho and Heikkinen, 2022). The RBV explains how unique assets, such as EMS or green human capital, can enable a sustainability-based advantage (Hamdoun, 2020; Khanra et al., 2022). On the other hand, RDT highlights how external factors, such as regulations, incentives, and stakeholder demands, shape access to and mobilization of critical resources for sustainability (Erdoğan et al., 2021). Building on these, the DC perspective emphasizes how firms integrate, make, and reconfigure internal and external competencies to adapt to rapidly evolving environmental and market conditions through strategic reconfiguration of practices (Coreynen et al., 2020; Helfat, 2022). Together, these perspectives provide a comprehensive theoretical foundation linking internal/external motivations to firm-level practices and, ultimately, to customer-oriented green actions. Within this theoretical framework, environmental management systems, sustainable supply chains, eco-design, and HRM emerge as dynamic components of corporate sustainability (see Fig. 1).

While internal management programs' positive impact on environmental and social performance is well documented (Gebhardt et al., 2023; Gimenez et al., 2012), attention has increasingly turned to the supply chain (Das et al., 2023; Kazancoglu et al., 2021; Seuring, 2011; Srivastava, 2007), innovative eco-design strategies (García-Sánchez et al., 2020; Kong et al., 2022; Mirabella et al., 2014), and the social dimension of sustainability through green HRM (Rahman et al., 2020). Empirical studies have demonstrated that green HRM has a positive impact on sustainable supply chains (Guerci et al., 2016; Zaidi et al., 2019) and broader organizational outcomes (Kramar, 2014; Paillé et al., 2020). Despite this growing literature, few studies have examined the combined impact of these practices or their mediating role in shaping customer-oriented green actions.

This study examines how external (e.g., regulation, incentives) and internal (e.g., ethics, self-commitment) drivers affect firms' DC and, ultimately, the enactment of customer-oriented green actions.

2.1. External and internal factors pushing the adoption of green practices

Although the literature identifies a variety of drivers of corporate sustainability, these are often classified as internal or external (Leonidou et al., 2017; Lewandowski, 2016; Lozano, 2015). External factors—such as environmental regulations and incentives—are widely recognized as motivating green practices (Brunnermeier and Cohen, 2003; Pinto, 2020). While legal compliance is a significant driver of sustainability-oriented processes (Paletta et al., 2021), firms may also be motivated by profit opportunities associated with green products (Kammerer, 2009) or by ethical considerations of managers (Schaltegger and Burritt, 2018).

Internal factors have also been found to play a key role in shaping firms' environmental attitudes (Heras-Saizarbitoria et al., 2016; Kammerer, 2009), often rooted in self-commitment and an understanding of the societal value of sustainability (Horbach et al., 2012). In this paper, internal factors include ethical sensitivity of both management and staff (Avram and Kühne, 2008; Garavan and McGuire, 2010; Hummel et al., 2019), green sensitivity in market entry strategies (Kiron et al., 2015), and commitment to corporate reputation and supply chain sustainability (Heras-Saizarbitoria et al., 2016; Könnölä and Unruh, 2007). External factors comprise profit motives, access to fiscal and administrative incentives, environmental regulations, and green public procurement policies (Aykol and Leonidou, 2015).

We hypothesize:

H1. *External motivations positively impact: (H1a) environmental management systems; (H1b) supplier selection; (H1c) product eco-design; (H1d) HRM.*

H2. *Internal motivations positively impact: (H2a) environmental management systems; (H2b) supplier selection; (H2c) product eco-design; (H2d) HRM.*

Some researchers suggest that external factors tend to be more proactive, while internal drivers may be more reactive or peripheral to a firm's core strategies (DeSimone and Popoff, 2000). Moreover, psychological theories suggest that intrinsic motivation is more powerful and enduring than extrinsic drivers (Herzberg, 2017). Eco-design and

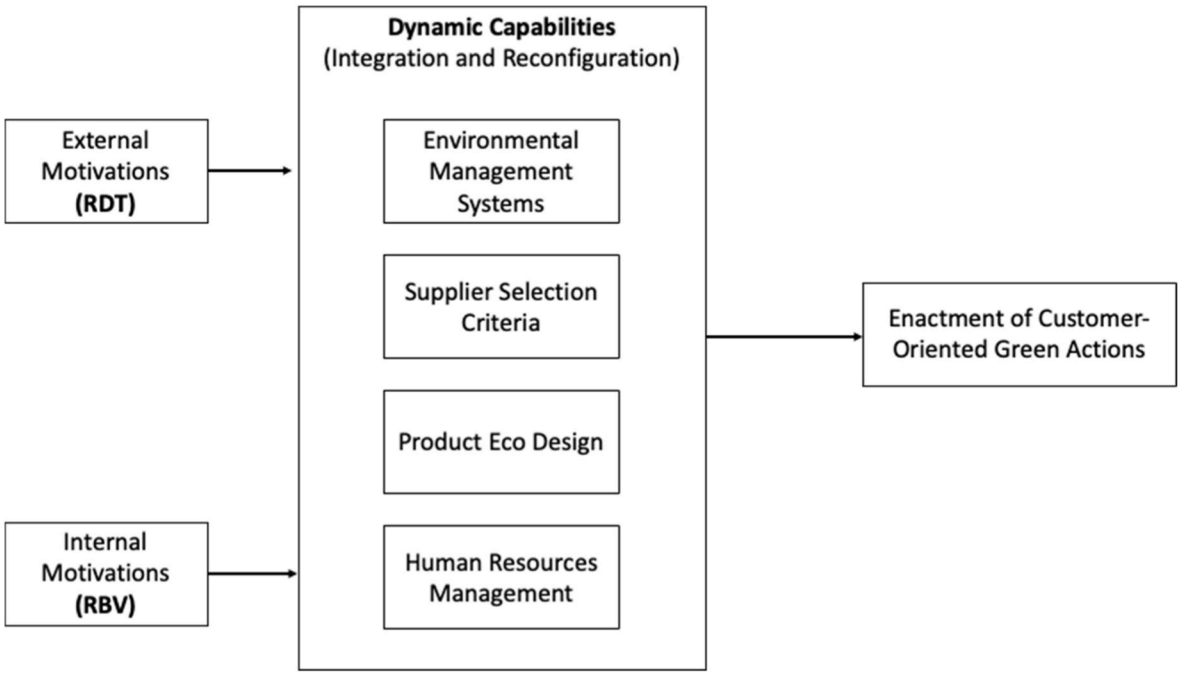

Fig. 1. Theoretical framework: RDT, RBV, and relation to the DC in enacting customer-oriented green actions.

HRM practices, for instance, are often driven by green values (Al-Swidi et al., 2022; García-Sánchez et al., 2020; Johansson, 2002; Merriman et al., 2016), whereas environmental management systems and supply chain sustainability are more frequently linked to external pressures (Melander, 2018).

2.2. Environmental management systems

Environmental management systems (EMSs) are integral to business strategies (Hui et al., 2001). A substantial body of literature, often grounded in neo-institutional theory, identifies external pressures—particularly from consumers and public administrations—as primary drivers for the implementation of such systems (Heras-Saizarbitoria et al., 2016). Notably, EMSs are structured around frameworks such as the EU's Environmental Management and Auditing Scheme (EMAS) and the ISO 14001 certification standard (Steger, 2000).

Within these frameworks, firms commit to continuous environmental improvement through the Deming cycle: a four-step methodology of plan, do, check, and act. This model supports the systematic reduction of waste, wastewater, and emissions. Consequently, practices such as environmental impact measurement, process efficiency optimization, renewable energy sourcing, and product eco-design are essential components in achieving ecological targets.

Numerous empirical studies support the idea that EMSs contribute significantly to sustainable development by improving both environmental and economic performance (Arimura et al., 2008; Darnall et al., 2008; Fresner and Engelhardt, 2004; Horbach et al., 2012; Hui et al., 2001; Rennings et al., 2006). Key benefits of EMS implementation include reduced process costs, improved productivity, regulatory compliance, and expanded market opportunities.

Furthermore, Iraldo et al. (2009) highlighted, in a study of 101 organizations, the positive influence of EMS adoption, particularly EMAS, on both final consumers and intermediate clients. EMAS adopters were found to demonstrate higher levels of innovation and competitive advantage. Importantly, the ability of EMSs to generate external stakeholder value is closely tied to effective communication. Hui et al. (2001) emphasize the dual role of EMAS, not only as a management tool but also as a communication mechanism that enhances stakeholder engagement.

Despite these benefits, small and medium-sized enterprises (SMEs) may face significant barriers in adopting EMSs, particularly EMAS, due to the associated costs and administrative complexity. However, for those that manage to implement such systems, these certifications can represent a distinctive advantage, signaling a strong environmental commitment and enhancing credibility in the eyes of customers, investors, and public stakeholders.

Accordingly, we propose the following hypothesis:

H3a. *Environmental management systems have a positive impact on the enactment of customer-oriented green actions.*

2.3. Suppliers' selection

The supply chain encompasses the procurement, distribution, and sale of raw materials, intermediates, and finished products. Traditionally, the effectiveness of a supply chain has been assessed based on transactional costs, product quality, service flexibility, and delivery time (Seuring, 2011). However, in sustainability-oriented firms, supply chains are increasingly designed to minimize negative social and environmental impacts (Govindan et al., 2015; Roberts, 2003).

As a result, certifications and eco-labels have gained prominence in supplier selection processes, as they signal environmental responsibility and help ensure the quality and safety of both products and production processes. Sustainability-oriented supplier selection criteria may include a preference for local suppliers, such as those engaged in by-product exchange within industrial districts, or suppliers that collaborate with recyclers and remanufacturers (Gunasekaran et al., 2015; Moktadir et al., 2020). These practices help reduce emissions from long-distance transportation and limit waste-related environmental impacts.

The literature on sustainable supply chain management has emphasized the importance of aligning suppliers with customers' environmental expectations. Several studies highlight the bidirectional relationship between customers and suppliers in green practices (Gualandris and Kalchschmidt, 2014), including the transmission of customer sustainability requirements upstream in the supply chain (Caniëls et al., 2013). In this context, customer pressure becomes a key driver for the adoption of environmentally responsible supplier selection

criteria, reinforcing the strategic importance of the supply base in achieving customer-oriented green actions (Seuring, 2011).

Moreover, sustainable procurement policies are frequently embedded within certified Environmental Management Systems, such as ISO 14001, which promote a systemic approach to evaluating suppliers based on their environmental performance. This integration reinforces the alignment between internal management practices and external supply chain choices, as introduced in Section 2.2.

Accordingly, we propose the following hypothesis:

H3b. *Supplier selection positively impacts the enactment of customer-oriented green actions.*

2.4. Product eco-design

Eco-design refers to the integration of environmental considerations into the design phase of a product or service (García-Sánchez et al., 2020). It addresses sustainability by evaluating the product across its entire life cycle, with a focus on durability, environmental footprint, and end-of-life management (Albino et al., 2009; Bianchi and Testa, 2022). Eco-designed products are associated with lower production costs (Plouffe et al., 2011) and increased customer loyalty, serving as a powerful communication tool that signals the firm's commitment to sustainable practices (Mustonen et al., 2016).

We argue that investing in eco-design practices, such as extending product lifespan, engaging in co-design with suppliers, or redesigning to reduce virgin plastic content, lays a foundation for customer-oriented green actions. These practices reflect the same environmental values that underpin the company's sustainability strategy, thereby enhancing alignment between internal processes and customer expectations.

Furthermore, previous research highlights the importance of clear, accurate, and credible environmental labeling in strengthening the link between eco-design and consumer behavior (D'Souza et al., 2006). Consumers are more likely to reward eco-designed products when environmental information is communicated transparently and effectively, thereby reinforcing the firm's green positioning in the market.

Recent trends in consumer awareness have further elevated the relevance of design approaches such as design for disassembly and circular design, which facilitate recyclability, component reuse, and end-of-life recovery. These approaches directly respond to growing consumer expectations for sustainable consumption models and product responsibility. In this context, eco-design is no longer confined to functionality and aesthetics but increasingly addresses the product's after-use value and environmental performance.

Packaging is also a critical aspect of eco-design, as it represents the most visible interface between the product and the consumer. Sustainable packaging solutions, such as biodegradable materials, minimalistic designs, or reusable containers, not only reduce environmental impact but also serve as tangible signals of a company's green values, influencing purchasing decisions and brand loyalty.

Additionally, as outlined in the previous sections, product eco-design is often supported by broader environmental management systems (EMSs), such as ISO 14001. These systems institutionalize environmental goals and practices across departments, including R&D and design, thereby integrating eco-design into the firm's strategic and operational framework.

Accordingly, we propose the following hypothesis:

H3c. *Product eco-design has a positive impact on the enactment of customer-oriented green actions.*

2.5. Human resource management (HRM)

Studies on human resource management (HRM) emphasize the critical role of employee training in enhancing performance and organizational outcomes (Bos-Brouwers, 2010; Jamali et al., 2015; Paillé et al., 2020). Well-structured training programs contribute to the development of skilled personnel, reduce employee turnover, and facilitate the achievement of strategic objectives (Hansson, 2007). Beyond training, research has also focused on employee welfare, work–life balance, and the impact of work-related stress on overall performance and organizational commitment (Chan et al., 2004; Teti and Andriotto, 2013). Measures such as health and safety policies, access to healthcare, transportation support, and family-friendly programs are shown to foster a more comfortable work environment, ultimately enhancing productivity and alignment with corporate goals (Warmate et al., 2020).

Despite its relevance, the relationship between HRM and customer-oriented green actions remains underexplored. While some scholars have identified a positive connection (Guerci et al., 2016; Renwick et al., 2013), recent contributions have called for further investigation into the role of HRM in bridging the gap between sustainable manufacturing and green organizational behavior (Gedam et al., 2021; Yong et al., 2020). Arshad et al. (2021) demonstrate, for example, that job satisfaction, a proactive work environment, and coherent company policies encourage discretionary behavior towards customers—an essential component of customer-oriented green actions.

This line of research converges on the concept of green HRM, which refers to HRM practices specifically designed to support environmental objectives. Green HRM encompasses both employee development (e.g., sustainability training, environmental awareness programs) and welfare initiatives (e.g., eco-friendly office practices, mobility benefits), fostering a culture that aligns personal values with corporate sustainability goals (Avram and Kühne, 2008; Bos-Brouwers, 2010).

By embedding environmental values within human resource policies and practices, green HRM plays a pivotal role in shaping employee behavior and promoting a sense of ownership over green initiatives. This approach is particularly effective when integrated with broader environmental management systems (as discussed in Section 2.2), which offer a strategic framework for aligning individual performance with environmental targets.

Moreover, green HRM fosters internal engagement that can translate into improved external outcomes, particularly when employees act as frontline ambassadors of a firm's environmental values—directly influencing customer perceptions and experiences.

Accordingly, we propose the following hypothesis:

H3d. *HRM has a positive impact on the enactment of customer-oriented green actions.*

2.6. Firm size

The relationship between firm size and environmental sustainability has been widely debated in the literature. Several studies suggest that firm size can influence managerial approaches and sustainability-related behaviors (López-Pérez et al., 2017). While some scholars find that smaller firms tend to exhibit more sustainable practices (Bourlakis et al., 2014), others report no significant relationship between size and sustainability reporting, except in the case of very large firms (Gallo and Christensen, 2011).

Nonetheless, a broad consensus indicates that larger firms are generally better equipped to adopt green practices due to their greater access to financial, human, and technological resources (Heras-Saizarbitoria et al., 2016; Rahman et al., 2020). These firms are also more likely to be subject to stakeholder scrutiny and institutional pressures, both of which encourage the formalization of environmental strategies. For instance, Balasubramanian et al. (2020) found that firm size positively correlates with the implementation of green supply chain practices, owing to the greater capacity for investment and system-wide coordination.

Firm size can also affect how environmental management systems, supplier relationships, product design, and HRM are operationalized and translated into customer-oriented actions. Larger firms may benefit from

economies of scale when implementing certified EMSs, more structured supplier selection procedures, dedicated design teams for eco-innovation, and formal HRM policies for environmental training and engagement. On the other hand, smaller firms may exhibit greater flexibility, faster implementation, and stronger value alignment across the organization, but may struggle with limited resources or a lack of formal systems.

Therefore, size does not act as a driver in itself, but rather as a moderating factor that can enhance, or in some cases constrain, the effectiveness of firm-specific factors in fostering customer-oriented green practices.

Accordingly, we propose the following hypothesis:

H4. *Firm size positively moderates the relationships between: (H4a) environmental management systems, (H4b) supplier selection, (H4c) product eco-design, and (H4d) HRM, and the enactment of customer-oriented green actions.*

2.7. Conceptual model

The previous sections integrated literature on green practices with a theoretical framework based on external and internal motivations, examining the drivers behind firms' enactment of customer-oriented green actions. Specifically, we identified four key firm-specific factors: environmental management systems, supplier selection, product eco-design, and human resource management (HRM).

We hypothesized that both external and internal motivations positively influence these firm-specific factors (H1–H2), which, in turn, positively affect the enactment of customer-oriented green actions (H3a–H3d). Additionally, we proposed that firm size moderates the strength of the relationships between each firm-specific factor and customer-oriented green actions (H4a–H4d).

In essence, this study proposes a moderated mediation model in which firm-specific factors act as mediators, firm size operates as a moderator, and the enactment of customer-oriented green actions is the dependent variable. Fig. 2 presents the proposed relationships.

3. Materials and methods

3.1. Sample

A survey was launched in 2019 targeting firms located in the industrial area of the Emilia-Romagna Region (RER), Italy. RER is among the most industrialized regions in Europe, characterized by a strong concentration of SMEs, manufacturing clusters, and service firms, all of which are embedded in long-established industrial districts. The region has also been a frontrunner in sustainability and innovation policies, supported by regional funding schemes and active participation in EU programs. These characteristics make Emilia-Romagna not only a fertile laboratory for observing how firms integrate sustainability into customer-oriented practices, but also a relevant reference point for comparable regions across Europe facing similar pressures of green transformation. The questionnaire was part of RER's comprehensive strategy to promote sustainable business models across the region's economic activities. Firms that had applied for public funding from RER were invited to participate in a survey covering various topics, including supply chain management, corporate welfare, environmental management, circular economy, planning, control, and communication strategies. The responses provided a detailed overview of the sustainable practices adopted by participating firms.

Responses were collected using a four-point Likert scale (ranging from 1 = "not implemented" to 4 = "fully implemented"), assessing the extent to which companies were involved in sustainable initiatives.

In designing and administering the questionnaire, we took particular care to mitigate common method biases as described by Podsakoff et al. (2003). To minimize social desirability and evaluation apprehension, respondents were assured that there were no right or wrong answers and were encouraged to respond honestly. Additionally, the question order was randomized to reduce pattern responses.

Following the sampling methodology of Olya and Gavilyan (2017), which is known for achieving high response rates in similar studies, we collaborated with a local authority that introduced the research team to participating firms and facilitated contact across various industrial sectors. As a result, we collected a total of 879 useable responses from firms of varying sizes and industries, as summarized in Table 1.

3.2. Measurements

The constructs in the study were measured through validated scales adapted from the literature, as follows:

- Environmental Management Systems (EMS) were assessed using five items adapted from Epstein and Roy (2001), which focused on

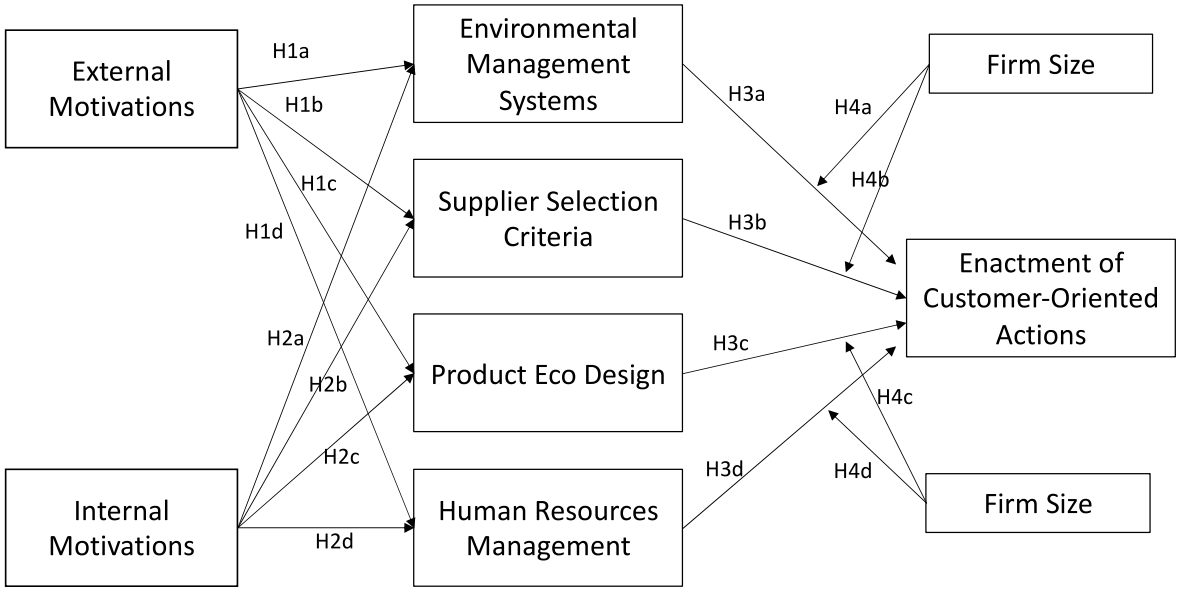

Fig. 2. The conceptual model.

Table 1
Sample distribution by company size and sector.

Industry	Micro (<10)	Small (10–49)	Medium (50–249)	Large (>249)	Total	% Total
Manufacturing: Food industries	18	22	3	0	43	**4.89 %**
Manufacturing: Fashion	10	18	6	0	34	**3.87 %**
Manufacturing: Metal	20	49	20	0	89	**10.13 %**
Manufacturing: Machinery & Equipment	6	47	30	2	85	**9.67 %**
Manufacturing: Other	37	67	26	5	135	**15.36 %**
Construction	5	4	5	0	14	**1.59 %**
Retail	42	10	1	1	54	**6.14 %**
Other Services	323	61	21	8	413	**46.99 %**
Other Industries	4	3	4	1	12	**1.37 %**
Total	**465**	**281**	**116**	**17**	**879**	**100 %**

budgeting for sustainable operations, accountability for environmental costs, and the integration of green budgeting principles.
- Supplier Selection was assessed with seven items adapted from Carter and Jennings (2004), Dubey et al. (2019), and Zeng et al. (2017). Items evaluated the extent to which firms consider suppliers' compliance with environmental regulations, use of eco-friendly materials, and commitment to environmental safety.
- Product Eco-Design was measured through five items adapted from Masi et al. (2018), which evaluated aspects such as product recyclability, repairability, the use of non-recyclable materials, and sustainability considerations during the design phase.
- Human Resource Management (HRM) practices were assessed using six items based on Ehnert et al. (2014), which included two items related to environmental training and four items focused on employee well-being.
- Customer-oriented green actions were measured using seven items adapted from Zhang et al. (2018). These items explored how firms communicate their environmental initiatives, monitor supply chain sustainability, and disclose green performance metrics.
- Firm Size was measured using employee headcount and annual revenue, following the European Commission (2015) classification: micro (<10 employees), small (10–49), medium (50–249), and large (>250).

External and internal motivations were assessed through five items adapted from Lozano (2015), which captured external drivers (e.g., regulation, incentives) and internal drivers (e.g., ethical values, organizational culture) underlying the adoption of green practices.

3.3. Procedure

To test the hypotheses, we employed structural equation modeling (SEM) using AMOS 25. SEM was chosen because it allows for the simultaneous estimation of measurement and structural models, enabling the assessment of both direct and indirect effects in our moderated mediation framework (Hair et al., 2019; Kline, 2016); moreover, our sample of 879 firms exceeds recommended thresholds for SEM applications (Hair et al., 2019; Kline, 2016), and the use of the ADF estimator is particularly suitable for large datasets (Byrne, 2010; Huang and Bentler, 2015).

In our model, environmental management systems, supplier selection, product eco-design, and HRM were specified as mediators of the relationship between motivation type (external and internal) and the enactment of customer-oriented green actions. Firm size was included as a moderator of the relationships between each firm-specific factor and customer-oriented green actions (see Fig. 2).

The analysis was structured to assess three key aspects:

- Direct and indirect effects of external and internal motivations on the enactment of customer-oriented green actions, mediated by firm-specific factors.
- The main effects of firm-specific factors on customer-oriented green actions are moderated by firm size.
- The conditional indirect effects of motivation type on customer-oriented green actions—i.e., the moderated mediation—through each firm-specific factor (supplier selection, product eco-design, HRM, and EMS), conditional on firm size.

This approach enables us to simultaneously estimate the influence of motivational antecedents, mediating mechanisms, and contextual moderators within a unified analytical framework, thereby providing a comprehensive test of the proposed conceptual model.

4. Results

4.1. Common method variance

To test for common method bias, we first conducted a collinearity diagnostic using SPSS, following the method outlined by Kock (2015). All variance inflation factor (VIF) values were below the threshold of 3, ranging from 1.26 to 2.19 (see Appendix, Table A.1), indicating that common method bias is unlikely to be a concern.

Secondly, we applied Harman's one-factor test, conducting an exploratory factor analysis in which the number of factors was constrained to one. The study revealed that a single factor explained only 28.60 % of the total variance, which is well below the critical threshold of 50 % (Podsakoff et al., 2003).

We then performed a confirmatory factor analysis (CFA) to verify the quality of the measurement model. All factor loadings exceeded the recommended 0.6 threshold (Bagozzi and Yi, 1988), while composite reliability (CR) and average variance extracted (AVE) surpassed the recommended thresholds of 0.70 and 0.50, respectively (Fornell and Larcker, 1981). Reliability and convergent validity were further supported by Cronbach's alpha values ranging from 0.82 to 0.84, and internal consistency measures (ρ) above 0.70 (see Appendix, Table A.1).

Discriminant validity was assessed by comparing the AVE of each construct with the squared correlation between constructs. Discriminant validity was confirmed, as the AVE values exceeded the squared inter-construct correlations (Fornell and Larcker, 1981).

The CFA model demonstrated a good overall fit, with $\chi^2/df < 3$, RMSEA = 0.06, and CFI = 0.91, all within acceptable ranges (Byrne, 2010).

4.2. Model estimation

The structural model demonstrated an adequate fit:
$\chi^2/df < 3$; RMSEA = 0.06; $p < 0.001$; CFI = 0.95.

Table 2 summarizes the model estimates, which are also graphically presented in Fig. 3 (non-significant paths are omitted for clarity).

The results show that external and internal motivations have distinct patterns of influence. Both significantly affect supplier selection (B = 0.17 vs. 0.30), while external motivations also significantly influence product eco-design (B = 0.15) and HRM (B = 0.19), but not EMS.

Table 2
Model estimates.

Hypothesis	Path	Estimate (SE)	p-value
H1a	External → EMS	0.04 (0.03)	= 0.27 n. s.
H1b	External → Supplier selection	0.17 (0.05)	= 0.001
H1c	External → Eco-design	0.15 (0.04)	<0.001
H1d	External → HRM	0.19 (0.05)	<0.01
Direct	External → Enactment	0.14 (0.04)	<0.001
H2a	Internal → EMS	0.29 (0.04)	<0.001
H2b	Internal → Supplier selection	0.30 (0.05)	<0.001
H2c	Internal → Eco-design	−0.03 (0.04)	= 0.50 n. s.
H2d	Internal → HRM	−0.11 (0.06)	= 0.05
Direct	Internal → Enactment	−0.02 (0.04)	= 0.55 n. s.
H3a	EMS → Enactment	0.22 (0.04)	<0.001
H3b	Supplier selection → Enactment	0.32 (0.03)	<0.001
H3c	Eco-design → Enactment	0.18 (0.04)	<0.01
H3d	HRM → Enactment	0.13 (0.03)	<0.001
H4a	Firm size × EMS → Enactment	−0.04 (0.05)	= 0.50 n. s.
H4b	Firm size × Supplier selection → Enactment	0.01 (0.04)	= 0.72 n. s.
H4c	Firm size × Eco-design → Enactment	−0.16 (0.05)	= 0.002
H4d	Firm size × HRM → Enactment	0.10 (0.05)	= 0.03

Conversely, internal motivations significantly affect EMS (B = 0.29), but not eco-design or HRM.

Regarding mediation, all firm-specific factors—EMS, supplier selection, eco-design, and HRM—significantly predict the enactment of customer-oriented green actions (supporting H3a–d). The strongest predictor is supplier selection, followed by EMS, eco-design, and HRM (see Table 3).

In terms of moderation (H4), firm size positively moderates the relationship between HRM and green actions (H4d) but negatively moderates the link between eco-design and green actions (H4c). No significant moderation effects were found for EMS or supplier selection (H4a, H4b).

These findings indicate that eco-design is more impactful in smaller firms, while HRM becomes more influential in larger firms, likely due to differences in structure, scale, and resource availability.

Finally, external motivations also have a direct effect on green action enactment, while internal motivations do not, suggesting that the four firm-specific factors fully mediate the impact of internal motivations.

4.3. Further analyses and alternative explanations

To rule out industry-based explanations, we split the sample between manufacturing and service firms, following a similar approach to Horbach et al. (2012), using sector dummies. The analysis showed no significant difference in customer-oriented green actions by industry type ($F(7, 412) = 0.84$, $p = 0.56$, $\eta^2 = 0.009$), nor between services and manufacturing (M_services = 2.07 vs. M_manufacturing = 2.16; $F(1, 878) = 2.81$, $p = 0.09$, $\eta^2 = 0.004$).

This confirms that the results are not sector-specific and may be generalizable across industries, aligning with recent calls in the literature to broaden the scope of green practice analyses (Confente et al., 2020).

5. Conclusions

While many studies have explored the determinants of green behavior from the consumer perspective, relatively few have investigated what drives firms to implement environmentally responsible practices—particularly those targeting customers. Recently, both scholars and policymakers have emphasized the need to understand what motivates firms to "go green," while maintaining a focus on the customer as the ultimate recipient of green innovations and practices (Confente et al., 2020). This study responds to these calls by adopting a firm-level perspective, examining the enactment of customer-oriented green actions as the dependent variable.

Table 3
Indirect effects.

Indirect	Mediation	SE	p-value
External → EMS → Enactment	0.01	0.01	0.19 ns
External → Supplier → Enactment	0.05	0.02	0.001
External → Eco → Enactment	0.03	0.01	0.004
External → HRM → Enactment	0.02	0.01	0.004
Internal → EMS → Enactment	0.06	0.01	<0.0001
Internal → Supplier → Enactment	0.10	0.02	<0.0001
Internal → Eco → Enactment	−0.01	0.01	0.46 ns
Internal → HRM → Enactment	−0.01	0.01	0.09 marg.sig.

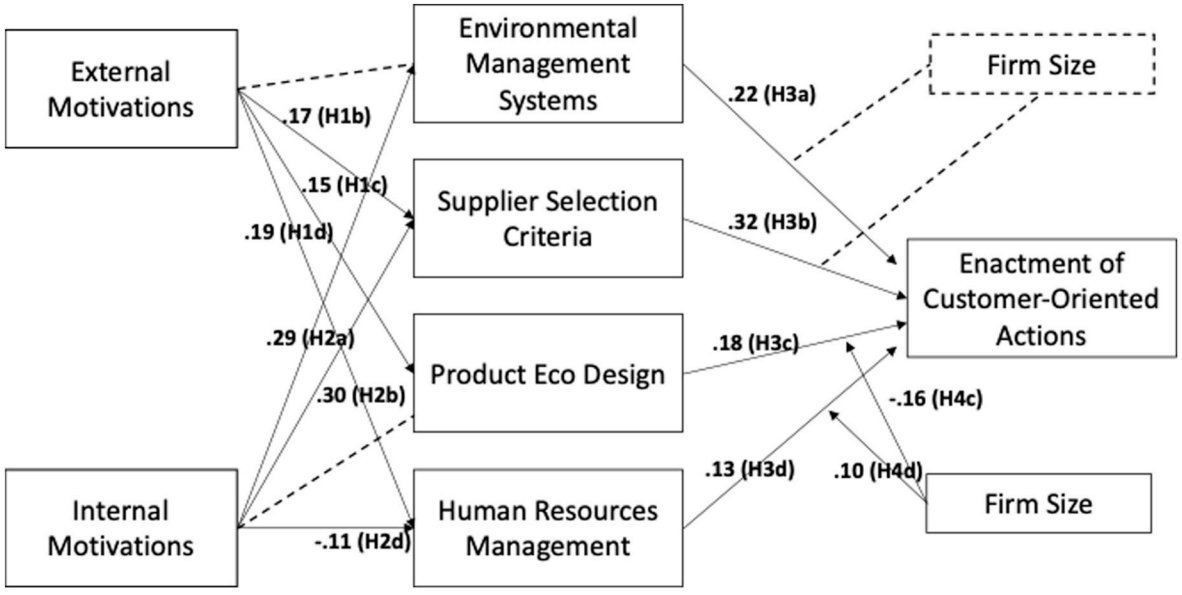

Fig. 3. Main Model with Estimates and Hypothesis
Note: All values are significant at p < 0.01 unless otherwise stated. Dotted lines indicate non-significant relationships.

Grounded in the theoretical distinction between external and internal motivations, this research leveraged a large dataset comprising hundreds of firms across various industries. The analysis revealed that these motivational factors significantly, albeit differently, influence environmental management systems, supplier selection, product eco-design, and HRM.

By enabling the simultaneous estimation of the effects of these firm-specific factors, this study integrates previously fragmented research strands into a unified theoretical framework. It also compares the relative influence of each factor, providing a clearer understanding of what drives firms to adopt customer-oriented sustainability practices.

Findings indicate that external motivations (e.g., regulations, fiscal incentives) and internal motivations (e.g., ethical values, organizational culture) affect different firm-level dimensions with varying strengths and even opposite directions. Specifically, EMS and supplier selection are more strongly driven by internal motivations, whereas product eco-design and HRM are more responsive to external motivations. All four firm-specific factors have a positive influence on the enactment of green actions toward customers. Still, the magnitude of their effects differs—supplier selection being the most impactful, followed by EMS, product eco-design, and HRM.

These insights have important theoretical implications, aligning with previous studies on the EMS (Heras-Saizarbitoria et al., 2016) and the sustainable supply chains (Liu et al., 2012), while advancing the field by showing how internal motivations outperform external ones in these domains. While incentives and regulations help firms adopt formal management systems and green supply chain practices, internal orientation toward sustainability plays a dominant role.

Conversely, external motivations were found to be more effective in driving product eco-design and HRM. However, internal motivations appeared to have a neutral or even negative effect in these areas, particularly in HRM, supporting psychological theories that highlight how external rewards can demotivate intrinsic engagement (Herzberg, 2017). This suggests that eco-design and employee engagement efforts should stem from genuine managerial commitment, rather than being externally imposed.

From a policy-making perspective, these results imply that public efforts and resources might be more effectively directed toward encouraging EMS and supplier selection, rather than HRM or eco-design, where outcomes are less predictable or even counterproductive when driven externally. For managers, this calls for strategic alignment: to embrace external opportunities where relevant, while fostering internal green values that reinforce long-term change.

Finally, the role of firm size was tested as a moderator. While size had a positive influence on the relationship between HRM and green action enactment, and an adverse effect on the eco-design link, no moderation was found for EMS and supplier selection. These findings help reconcile past contradictory results by showing that firm size does not universally amplify or reduce sustainability outcomes but rather modulates specific pathways differently. Practically, this means that large firms are not automatically more effective in enacting customer-oriented green practices; instead, they possess distinct advantages and challenges compared to smaller firms.

The findings offer several insights for managers. First, supplier selection underscores the strategic value of building sustainable supply relations, highlighting the priority that managers should give to clear environmental criteria in procurement decisions. Second, the role of EMS as a critical internal capability underscores the importance of investing in structured systems for monitoring, reporting, and continuous improvement, not only to ensure regulatory compliance but also to foster long-term customer trust. Third, the effects of firm size suggest that managerial strategies should be tailored to the specific context. While smaller firms can leverage the ability to innovate through eco-design, larger firms can invest in structured HRM practices to foster employee engagement in sustainability.

By demonstrating how the four firm-specific practices function as mediating mechanisms, our results support a DS interpretation, in which firms reconfigure internal processes (EMS, HRM), operational routines (supplier selection), and innovation-oriented activities (eco-design) to translate motivational antecedents into customer-oriented actions, aligning with the RBV, as these practices function as a set of organizational capabilities that enable value creation, and with RDT, given the role of regulatory and market pressures in shaping the deployment of such capabilities. Future studies may further explore how firms develop these capabilities over time or under varying institutional conditions.

6. Limitations and future research

This study is not without limitations. First, the sample is region-specific and based on a self-selection process, as it includes only firms that applied for public funding in the Emilia-Romagna Region (RER). This introduces potential selection bias, as these firms may already have an above-average interest in sustainability.

Second, the regional focus limits the generalizability of findings. Although the results show consistent patterns, sustainable management practices and customer sensitivity to green actions may vary significantly across regions, within Italy, and across different countries. Cultural, regulatory, and market-specific dynamics in Europe, North America, or Asia can shape green strategies in distinct ways.

Building on our integrated RBV, RDT, and DC framework, future studies may further explore how firms develop and combine environmental capabilities over time, as well as how capability formation varies across different institutional environments, regulatory pressures, or stages of sustainability transition. Longitudinal or comparative designs would deepen understanding of how motivational factors can drive capability building and the enactment of customer-oriented green actions.

Future research could address these limitations by extending the analysis to firms operating in different national and cultural contexts, possibly comparing regional dynamics and institutional environments. Additionally, longitudinal studies could examine how motivations and actions evolve, particularly in response to changing regulatory frameworks and market expectations.

CRediT authorship contribution statement

Angelo Paletta: Writing – review & editing, Supervision, Conceptualization. **Daniele Scarpi:** Methodology, Data curation. **Genc Alimehmeti:** Writing – review & editing, Writing – original draft, Methodology, Investigation. **Eleonora Foschi:** Writing – review & editing, Writing – original draft.

Compliance with ethical standards

The authors declare that there are no conflicts of interest regarding the publication of this paper. This research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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necessarily reflect those of the Emilia-Romagna Region.

APPENDIX

Table A.1
Questionnaire items with constructs' Cronbach's Alpha, AVE, CR and VIF.

Construct	Cronbach Alpha	AVE	CR	VIF
Motivations: Internal	0.85	0.71	0.78	2.09
1. Ethical sensitivity of top management				
2. Green sensitivity when entering new geographic markets/customer segments				
3. Desire to stay true to the corporate reputation				
4. Desire to improve the greenness of the supply chain				
5. Ethical sensitivity to the importance of waste reduction				
Motivations: External	0.85	0.62	0.81	2.19
1. Profit from the sale of residues and secondary raw materials				
2. Access to public incentives				
3. Environmental legislation in force or forthcoming				
4. Need to comply with public procurement requirements (Green Public Procurement)				
5. Administrative and tax simplifications				
Environmental management systems	0.88	0.78	0.81	1.75
1. Adoption of an energy management system compliant with ISO 50001 standards				
2. Budgeting of environmental investments				
3. Study of Life Cycle Assessment of process and/or product				
4. Accounting of environmental costs				
5. Implementation of Environmental management systems of environmental performance evaluation				
Suppliers selection criteria	0.89	0.72	0.83	1.37
1. Safety and environment protection				
2. Use of products and services with low environmental impact				
3. Compliance with the rules of safety and health of workers				
4. Compliance with environmental legislation				
5. Green reporting				
6. Ethical and social "green" clauses				
7. Respect of laws for the management of environmental risks				
Product eco-design	0.85	0.75	0.81	1.52
1. Eco-design aimed at extending the life cycle of the product by facilitating disassembly, repairability and maintenance				
2. Eco-design aimed at the transition of a product to a service				
3. Development of innovation projects and/or co-design actions with suppliers, oriented towards sustainability				
4. Sharing of services/utilities with other companies according to the industrial symbiosis approach				
5. Product redesign aimed at reducing or replacing virgin plastic (where present)				
Human resource management	0.84	0.73	0.83	1.26
1. Advanced professional/specialist training, in addition to legal obligations, language training, etc.				
2. Training/awareness raising actions on sustainability issues				
3. Hourly flexibility for work/life balance needs				
4. Time-saving services (e.g., company messenger, bureaucratic assistance, parcel reception in the company, etc.)				
5. Parental leave/additional paid leave for maternity/paternity leave				
6. Periodic listening initiatives to know the degree of well-being, needs and needs of employees (e.g., questionnaires, meetings, meetings, etc.)				
Enactment of customer-oriented green actions	0.86	0.72	0.82	0.48
1. Information on values, environmental commitments and results achieved (e.g., waste reduction, water consumption, atmospheric and noise emissions)				
2. Information on values, social commitments and results achieved (e.g., collaborations with social associations and cooperatives, voluntary work, cultural and philanthropic activities, etc.)				
3. Information on the environmental and social performances of the products/services provided				
4. Transparent information on the supply chain				
5. Adequate information on the management of any waste				
6. Development of dialogue tools, periodic surveys on the level of satisfaction and expectations of customers/consumers through questionnaires or other survey tools				
7. Development of common innovation tools and/or co-design actions aimed at sustainability				

Data availability

The data that has been used is confidential.

References

Ahmad, W., Zhang, Q., 2020. Green purchase intention: effects of electronic service quality and customer green psychology. J. Clean. Prod. 267, 122053. https://doi.org/10.1016/j.jclepro.2020.122053.

Albino, V., Balice, A., Dangelico, R.M., 2009. Environmental strategies and green product development: an overview on sustainability-driven companies. Bus. Strat. Environ. 18, 83–96. https://doi.org/10.1002/bse.638.

Al-Swidi, A.K., Al-Hakimi, M.A., Gelaidan, H.M., Al-Temimi, S.K.A.J., 2022. How does consumer pressure affect green innovation of manufacturing SMEs in the presence of green human resource management and green values? A moderated mediation analysis. Business Ethics, the Environment & Responsibility 0, 1–27. https://doi.org/10.1111/beer.12459.

Arimura, T.H., Hibiki, A., Katayama, H., 2008. Is a voluntary approach an effective environmental policy instrument?: a case for environmental management systems. J. Environ. Econ. Manag. 55, 281–295. https://doi.org/10.1016/j.jeem.2007.09.002.

Arshad, M., Abid, G., Khan, M., 2021. Impact of Employee's Environmental Concern on Ecological Green Behaviour: Mediation Mechanism of Employee Customer Oriented OCB and Organisational Commitment 14, p. 2020.

Avram, D.O., Kühne, S., 2008. Implementing responsible business behavior from a strategic management perspective: developing a framework for Austrian SMEs. J. Bus. Ethics 82, 463–475. https://doi.org/10.1007/s10551-008-9897-7.

Aykol, B., Leonidou, L.C., 2015. Researching the green practices of smaller service firms: a theoretical, methodological, and empirical assessment. J. Small Bus. Manag. 53, 1264–1288. https://doi.org/10.1111/jsbm.12118.

Bagozzi, R.P., Yi, Y., 1988. On the evaluation of structural equation models. JAMS 16, 74–94. https://doi.org/10.1007/BF02723327.

Balasubramanian, S., Shukla, V., Chanchaichujit, J., 2020. Firm size implications for environmental sustainability of supply chains: evidence from the UAE. Manag. Environ. Qual. Int. J. 31, 1375–1406. https://doi.org/10.1108/MEQ-01-2020-0004.

Bianchi, G., Testa, F., 2022. How can SMEs effectively embed environmental sustainability? Evidence on the relationships between cognitive frames, life cycle management and organizational learning process. Business Ethics, the Environment & Responsibility 31, 634–648. https://doi.org/10.1111/beer.12432.

Bocken, N., Short, S., Rana, P., Evans, S., 2013. A value mapping tool for sustainable business modelling. Corp. Gov. 13, 482–497. https://doi.org/10.1108/CG-06-2013-0078.

Bos-Brouwers, H.E.J., 2010. Corporate sustainability and innovation in SMEs: evidence of themes and activities in practice. Bus. Strat. Environ. 19, 417–435. https://doi.org/10.1002/bse.652.

Bourlakis, M., Maglaras, G., Aktas, E., Gallear, D., Fotopoulos, C., 2014. Firm size and sustainable performance in food supply chains: insights from Greek SMEs. International Journal of Production Economics, Sustainable Food Supply Chain Management 152, 112–130. https://doi.org/10.1016/j.ijpe.2013.12.029.

Brunnermeier, S.B., Cohen, M.A., 2003. Determinants of environmental innovation in US manufacturing industries. J. Environ. Econ. Manag. 45, 278–293. https://doi.org/10.1016/S0095-0696(02)00058-X.

Byrne, M.B., 2010. Structural Equation Modeling with AMOS : Basic Concepts, Applications, and Programming, second ed. Routledge. https://doi.org/10.4324/9780203805534.

Camilleri, M.A., 2022. Strategic attributions of corporate social responsibility and environmental management: the business case for doing well by doing good. Sustain. Dev. 30, 409–422. https://doi.org/10.1002/sd.2256.

Caniëls, M.C.J., Gehrsitz, M.H., Semeijn, J., 2013. Participation of suppliers in greening supply chains: an empirical analysis of German automotive suppliers. Journal of Purchasing and Supply Management, Special Issue Ipsera 19, 134–143. https://doi.org/10.1016/j.pursup.2013.02.005, 2012.

Carter, C.R., Jennings, M.M., 2004. The role of purchasing in corporate social responsibility: a structural equation analysis. J. Bus. Logist. 25, 145–186. https://doi.org/10.1002/j.2158-1592.2004.tb00173.x.

Chan, L.L.M., Shaffer, M.A., Snape, E., 2004. In search of sustained competitive advantage: the impact of organizational culture, competitive strategy and human resource management practices on firm performance. Int. J. Hum. Resour. Manag. 15, 17–35. https://doi.org/10.1080/0958519032000157320.

Confente, I., Scarpi, D., Russo, I., 2020. Marketing a new generation of bio-plastics products for a circular economy: the role of green self-identity, self-congruity, and perceived value. J. Bus. Res. 112, 431–439. https://doi.org/10.1016/j.jbusres.2019.10.030.

Coreynen, W., Matthyssens, P., Vanderstraeten, J., van Witteloostuijn, A., 2020. Unravelling the internal and external drivers of digital servitization: a dynamic capabilities and contingency perspective on firm strategy. Ind. Mark. Manag. 89, 265–277. https://doi.org/10.1016/j.indmarman.2020.02.014.

Darnall, N., Henriques, I., Sadorsky, P., 2008. Do environmental management systems improve business performance in an international setting? Journal of International Management, The Role of Corporate Social and Environmental Responsibility in International Business 14, 364–376. https://doi.org/10.1016/j.intman.2007.09.006.

Das, A.K., Mukherjee, J., Chatterjee, U., 2023. From trash to treasure: advancing the socio-ecological practice of rag picking for sustainable development in the Chandannagar town of Hooghly, West Bengal, India. Socio Ecol Pract Res 5, 325–340. https://doi.org/10.1007/s42532-023-00158-6.

DeSimone, L.D., Popoff, F., 2000. Eco-Efficiency: the Business Link to Sustainable Development. MIT Press.

Drempetic, S., Klein, C., Zwergel, B., 2020. The influence of firm size on the ESG score: corporate sustainability ratings under review. J. Bus. Ethics 167, 333–360. https://doi.org/10.1007/s10551-019-04164-1.

D'Souza, C., Taghian, M., Lamb, P., 2006. An empirical study on the influence of environmental labels on consumers. Corp. Commun. Int. J. 11, 162–173. https://doi.org/10.1108/13563280610661697.

Dubey, R., Gunasekaran, A., Childe, S.J., Papadopoulos, T., Helo, P., 2019. Supplier relationship management for circular economy: influence of external pressures and top management commitment. Manag. Decis. 57, 767–790. https://doi.org/10.1108/MD-04-2018-0396.

Ehnert, I., Harry, W., Zink, K.J. (Eds.), 2014. Sustainability and Human Resource Management, CSR, Sustainability, Ethics & Governance. Springer Berlin Heidelberg, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-37524-8.

Epstein, M.J., Roy, M.-J., 2001. Sustainability in action: identifying and measuring the key performance drivers. Long. Range Plan. 34, 585–604. https://doi.org/10.1016/S0024-6301(01)00084-X.

Erdoğan, S., Çakar, N.D., Ulucak, R., Danish, Kassouri, Y., 2021. The role of natural resources abundance and dependence in achieving environmental sustainability: evidence from resource-based economies. Sustain. Dev. 29, 143–154. https://doi.org/10.1002/sd.2137.

European Commission, 2015. User Guide to the SME Definition. Publications Office of the European Union, Luxembourg.

Fornell, C., Larcker, D.F., 1981. Structural equation models with unobservable variables and measurement error: algebra and statistics. J. Mark. Res. 18, 382–388. https://doi.org/10.1177/002224378101800313.

Freitas, W.R. de S., Caldeira Oliveira, J.H., Teixeira, A.A., Stefanelli, N.O., 2020. Green human resource management, corporate social responsibility and customer relationship management: relationship analysis in the Brazilian context. Int. J. Prod. Perform. Manag. 70, 1705–1727. https://doi.org/10.1108/IJPPM-12-2019-0597.

Fresner, J., Engelhardt, G., 2004. Experiences with integrated management systems for two small companies in Austria. Journal of Cleaner Production, SME's and Experiences with Environmental Management Systems 12, 623–631. https://doi.org/10.1016/j.jclepro.2003.09.013.

Gallo, P.J., Christensen, L.J., 2011. Firm size matters: an empirical investigation of organizational size and ownership on sustainability-related behaviors. Bus. Soc. 50, 315–349. https://doi.org/10.1177/0007650311398784.

Garavan, T.N., McGuire, D., 2010. Human resource development and society: human resource development's role in embedding corporate social responsibility, sustainability, and ethics in organizations. Adv. Develop. Hum. Resour. 12, 487–507. https://doi.org/10.1177/1523422310394757.

García-Sánchez, I.-M., Gallego-Álvarez, I., Zafra-Gómez, J.-L., 2020. Do the ecoinnovation and ecodesign strategies generate value added in munificent environments? Bus. Strat. Environ. 29, 1021–1033. https://doi.org/10.1002/bse.2414.

Gebhardt, M., Thun, T.W., Seefloth, M., Zülch, H., 2023. Managing sustainability—Does the integration of environmental, social and governance key performance indicators in the internal management systems contribute to companies' environmental, social and governance performance? Bus. Strat. Environ. 32, 2175–2192. https://doi.org/10.1002/bse.3242.

Gedam, V.V., Raut, R.D., Jabbour, A.B.L. de S., Narkhede, B.E., Grebinevych, O., 2021. Sustainable manufacturing and green human resources: critical success factors in the automotive sector. Bus. Strat. Environ. 30, 1296–1313. https://doi.org/10.1002/bse.2685.

Gimenez, C., Sierra, V., Rodon, J., 2012. Sustainable operations: their impact on the triple bottom line. International Journal of Production Economics, Sustainable Development of Manufacturing and Services 140, 149–159. https://doi.org/10.1016/j.ijpe.2012.01.035.

Govindan, K., Diabat, A., Madan Shankar, K., 2015. Analyzing the drivers of green manufacturing with fuzzy approach. Journal of Cleaner Production, Integrating Cleaner Production into Sustainability Strategies 96, 182–193. https://doi.org/10.1016/j.jclepro.2014.02.054.

Gualandris, J., Kalchschmidt, M., 2014. Customer pressure and innovativeness: their role in sustainable supply chain management. Journal of Purchasing and Supply Management, Special issue of best papers of the 22nd annual IPSERA conference 2013: Purchasing & Supply Management for a Sustainable World 20, 92–103. https://doi.org/10.1016/j.pursup.2014.03.001.

Guerci, M., Longoni, A., Luzzini, D., 2016. Translating stakeholder pressures into environmental performance – the mediating role of green HRM practices. Int. J. Hum. Resour. Manag. 27, 262–289. https://doi.org/10.1080/09585192.2015.1065431.

Gunasekaran, A., Subramanian, N., Rahman, S., 2015. Green supply chain collaboration and incentives: current trends and future directions. Transp. Res. Part E: Logistics and Transportation Review, Green Supply Chain Collaboration and Incentives 74, 1–10. https://doi.org/10.1016/j.tre.2015.01.002.

Hair, J.F., Risher, J.J., Sarstedt, M., Ringle, C.M., 2019. When to use and how to report the results of PLS-SEM. Eur. Bus. Rev. 31, 2–24. https://doi.org/10.1108/EBR-11-2018-0203.

Hamdoun, M., 2020. The antecedents and outcomes of environmental management based on the resource-based view: a systematic literature review. Manag. Environ. Qual. Int. J. 31, 451–469. https://doi.org/10.1108/MEQ-12-2019-0280.

Hansson, B., 2007. Company-based determinants of training and the impact of training on company performance: results from an international HRM survey. Pers. Rev. 36, 311–331. https://doi.org/10.1108/00483480710726163.

Helfat, C.E., 2022. Strategic organization, dynamic capabilities, and the external environment. Strateg. Organ. 20, 734–742. https://doi.org/10.1177/14761270221115377.

Heras-Saizarbitoria, I., Arana, G., Boiral, O., 2016. Outcomes of environmental management systems: the role of motivations and firms' characteristics. Bus. Strat. Environ. 25, 545–559. https://doi.org/10.1002/bse.1884.

Herzberg, F., 2017. Motivation to Work. Routledge.

Horbach, J., Rammer, C., Rennings, K., 2012. Determinants of eco-innovations by type of environmental impact — the role of regulatory push/pull, technology push and market pull. Ecol. Econ. 78, 112–122. https://doi.org/10.1016/j.ecolecon.2012.04.005.

Huang, Y., Bentler, P.M., 2015. Behavior of asymptotically distribution free test statistics in covariance versus correlation structure analysis. Struct. Equ. Model.: A Multidiscip. J. 22, 489–503. https://doi.org/10.1080/10705511.2014.954078.
Hui, I.K., Chan, A.H.S., Pun, K.F., 2001. A study of the environmental management system implementation practices. J. Clean. Prod. 9, 269–276. https://doi.org/10.1016/S0959-6526(00)00061-5.
Hummel, K., Schlick, C., Fifka, M., 2019. The role of sustainability performance and accounting assurors in sustainability assurance engagements. J. Bus. Ethics 154, 733–757. https://doi.org/10.1007/s10551-016-3410-5.
Ioannou, I., Kassinis, G., Papagiannakis, G., 2023. The impact of perceived greenwashing on customer satisfaction and the contingent role of capability reputation. J. Bus. Ethics 185, 333–347. https://doi.org/10.1007/s10551-022-05151-9.
Iraldo, F., Testa, F., Frey, M., 2009. Is an environmental management system able to influence environmental and competitive performance? The case of the eco-management and audit scheme (EMAS) in the European union. J. Clean. Prod. 17, 1444–1452. https://doi.org/10.1016/j.jclepro.2009.05.013.
Isac, N., Javed, A., Radulescu, M., Cismasu, I.D.L., Yousaf, Z., Serbu, R.S., 2025. Is greenwashing impacting on green brand trust and purchase intentions? Mediating role of environmental knowledge. Environ. Dev. Sustain. 27, 21329–21346. https://doi.org/10.1007/s10668-023-04352-0.
Jamali, D.R., El Dirani, A.M., Harwood, I.A., 2015. Exploring human resource management roles in corporate social responsibility: the CSR-HRM co-creation model. Bus. Ethics Eur. Rev. 24, 125–143. https://doi.org/10.1111/beer.12085.
Johansson, G., 2002. Success factors for integration of ecodesign in product development: a review of state of the art. Environ. Manag. Health 13, 98–107. https://doi.org/10.1108/09566160210417868.
Kammerer, D., 2009. The effects of customer benefit and regulation on environmental product innovation.: empirical evidence from appliance manufacturers in Germany. Ecol. Econ. 68, 2285–2295. https://doi.org/10.1016/j.ecolecon.2009.02.016.
Kazancoglu, I., Sagnak, M., Kumar Mangla, S., Kazancoglu, Y., 2021. Circular economy and the policy: a framework for improving the corporate environmental management in supply chains. Bus. Strat. Environ. 30, 590–608. https://doi.org/10.1002/bse.2641.
Khanra, S., Kaur, P., Joseph, R.P., Malik, A., Dhir, A., 2022. A resource-based view of green innovation as a strategic firm resource: present status and future directions. Bus. Strat. Environ. 31, 1395–1413. https://doi.org/10.1002/bse.2961.
Kiron, D., Kruschwitz, N., Haanaes, K., Reeves, M., 2015. Joining forces: collaboration and leadership for sustainability. MIT Sloan Manag. Rev. 56, 0–0.
Kline, R.B., 2016. Principles and Practice of Structural Equation Modeling. Guilford Press, New York, NY.
Kock, N., 2015. Common method bias in PLS-SEM: a full collinearity assessment approach. Int. J. e-Collaboration [WWW Document] URL. www.igi-global.com/article/common-method-bias-in-pls-sem/132843 (accessed 2.10.21).
Kong, L., Wang, L., Li, F., Tian, G., Li, J., Cai, Z., Zhou, J., Fu, Y., 2022. A life-cycle integrated model for product eco-design in the conceptual design phase. J. Clean. Prod. 363, 132516. https://doi.org/10.1016/j.jclepro.2022.132516.
Könnölä, T., Unruh, G.C., 2007. Really changing the course: the limitations of environmental management systems for innovation. Bus. Strat. Environ. 16, 525–537. https://doi.org/10.1002/bse.487.
Kramar, R., 2014. Beyond strategic human resource management: is sustainable human resource management the next approach? Int. J. Hum. Resour. Manag.
Laukkanen, M., Tura, N., 2022. Sustainable value propositions and customer perceived value: clothing library case. J. Clean. Prod. 378, 134321. https://doi.org/10.1016/j.jclepro.2022.134321.
Leonidou, L.C., Christodoulides, P., Kyrgidou, L.P., Palihawadana, D., 2017. Internal drivers and performance consequences of small firm green business strategy: the moderating role of external forces. J. Bus. Ethics 140, 585–606. https://doi.org/10.1007/s10551-015-2670-9.
Lewandowski, M., 2016. Designing the business models for circular economy—towards the conceptual framework. Sustainability 8, 43. https://doi.org/10.3390/su8010043.
Liao, Z., 2023. Supply chain optimization for environmental sustainability and economic growth. Environ. Sci. Pollut. Res. 30, 121599–121613. https://doi.org/10.1007/s11356-023-30521-9.
Liu, X., Yang, J., Qu, S., Wang, L., Shishime, T., Bao, C., 2012. Sustainable production: practices and determinant factors of green supply chain management of Chinese companies. Bus. Strat. Environ. 21, 1–16. https://doi.org/10.1002/bse.705.
Longoni, A., Cagliano, R., 2016. Human resource and customer benefits through sustainable operations. Int. J. Oper. Prod. Manag. 36, 1719–1740. https://doi.org/10.1108/IJOPM-11-2014-0564.
López-Pérez, M.E., Melero, I., Sese, F.J., 2017. Management for sustainable development and its impact on firm value in the SME context: does size matter? Bus. Strat. Environ. 26, 985–999. https://doi.org/10.1002/bse.1961.
Lozano, R., 2015. A holistic perspective on corporate sustainability drivers. Corp. Soc. Responsib. Environ. Manag. 22, 32–44. https://doi.org/10.1002/csr.1325.
Masi, D., Kumar, V., Garza-Reyes, J.A., Godsell, J., 2018. Towards a more circular economy: exploring the awareness, practices, and barriers from a focal firm perspective. Prod. Plann. Control 29, 539–550. https://doi.org/10.1080/09537287.2018.1449246.
Mehraj, D., Qureshi, I.H., Singh, G., Nazir, N.A., Basheer, S., Nissa, V. u, 2023. Green marketing practices and green consumer behavior: demographic differences among young consumers. Bus. Strategy Dev. 6, 571–585. https://doi.org/10.1002/bsd2.263.
Melander, L., 2018. Customer and supplier collaboration in green product innovation: external and internal capabilities. Bus. Strat. Environ. 27, 677–693. https://doi.org/10.1002/bse.2024.
Merriman, K.K., Sen, S., Felo, A.J., Litzky, B.E., 2016. Employees and sustainability: the role of incentives. J. Manag. Psychol. 31, 820–836. https://doi.org/10.1108/JMP-09-2014-0285.
Mirabella, N., Castellani, V., Sala, S., 2014. Current options for the valorization of food manufacturing waste: a review. J. Clean. Prod. 65, 28–41. https://doi.org/10.1016/j.jclepro.2013.10.051.
Moktadir, M.A., Kumar, A., Ali, S.M., Paul, S.K., Sultana, R., Rezaei, J., 2020. Critical success factors for a circular economy: implications for business strategy and the environment. Bus. Strat. Environ. 29, 3611–3635. https://doi.org/10.1002/bse.2600.
Mustonen, N., Karjaluoto, H., Jayawardhena, C., 2016. Customer environmental values and their contribution to loyalty in industrial markets. Bus. Strat. Environ. 25, 512–528. https://doi.org/10.1002/bse.1882.
Olya, H.G.T., Gavilyan, Y., 2017. Configurational models to predict residents' support for tourism development. J. Trav. Res. 56, 893–912. https://doi.org/10.1177/0047287516667850.
Paillé, P., Valéau, P., Renwick, D.W., 2020. Leveraging green human resource practices to achieve environmental sustainability. J. Clean. Prod. 260, 121137. https://doi.org/10.1016/j.jclepro.2020.121137.
Paletta, A., Foschi, E., Alimehmeti, G., Bonoli, A., 2021. A step-by-step process towards an evolutionary policy encouraging the adoption of sustainable business models. Sustainability 13 (3), 1176. https://doi.org/10.3390/su13031176.
Pinto, L., 2020. Green supply chain practices and company performance in Portuguese manufacturing sector. Bus. Strat. Environ. 29, 1832–1849. https://doi.org/10.1002/bse.2471.
Plouffe, S., Lanoie, P., Berneman, C., Vernier, M.-F., 2011. Economic benefits tied to ecodesign. J. Clean. Prod. 19, 573–579. https://doi.org/10.1016/j.jclepro.2010.12.003.
Podsakoff, P.M., MacKenzie, S.B., Lee, J.-Y., Podsakoff, N.P., 2003. Common method biases in behavioral research: a critical review of the literature and recommended remedies. J. Appl. Psychol. 88, 879–903. https://doi.org/10.1037/0021-9010.88.5.879.
Prieto-Sandoval, V., Jaca, C., Santos, J., Baumgartner, R.J., Ormazabal, M., 2019. Key strategies, resources, and capabilities for implementing circular economy in industrial small and medium enterprises. Corp. Soc. Responsib. Environ. Manag. 26, 1473–1484. https://doi.org/10.1002/csr.1761.
Rahman, M., Aziz, S., Hughes, M., 2020. The product-market performance benefits of environmental policy: why customer awareness and firm innovativeness matter. Bus. Strat. Environ. 29, 2001–2018. https://doi.org/10.1002/bse.2484.
Rennings, K., 2000. Redefining innovation — eco-innovation research and the contribution from ecological economics. Ecol. Econ. 32, 319–332. https://doi.org/10.1016/S0921-8009(99)00112-3.
Rennings, K., Ziegler, A., Ankele, K., Hoffmann, E., 2006. The influence of different characteristics of the EU environmental management and auditing scheme on technical environmental innovations and economic performance. Ecol. Econ. 57, 45–59. https://doi.org/10.1016/j.ecolecon.2005.03.013.
Renwick, D.W.S., Redman, T., Maguire, S., 2013. Green human resource management: a review and research agenda. Int. J. Manag. Rev. 15, 1–14. https://doi.org/10.1111/j.1468-2370.2011.00328.x.
Roberts, S., 2003. Supply chain specific? Understanding the patchy success of ethical sourcing initiatives. Supply Chain 144, 159–170.
Rubel, M.R.B., Kee, D.M.H., Rimi, N.N., 2021. The influence of green HRM practices on green service behaviors: the mediating effect of green knowledge sharing. Employee Relat. 43, 996–1015. https://doi.org/10.1108/ER-04-2020-0163.
Schaltegger, S., Burritt, R., 2018. Business cases and corporate engagement with sustainability: differentiating ethical motivations. J. Bus. Ethics 147, 241–259. https://doi.org/10.1007/s10551-015-2938-0.
Seuring, S., 2011. Supply chain management for sustainable products – insights from research applying mixed methodologies. Bus. Strat. Environ. 20, 471–484. https://doi.org/10.1002/bse.702.
Sharma, K., Aswal, C., Paul, J., 2023. Factors affecting green purchase behavior: a systematic literature review. Bus. Strat. Environ. 32, 2078–2092. https://doi.org/10.1002/bse.3237.
Srivastava, S.K., 2007. Green supply-chain management: a state-of-the-art literature review. Int. J. Manag. Rev. 9, 53–80. https://doi.org/10.1111/j.1468-2370.2007.00202.x.
Steger, U., 2000. Environmental management systems: empirical evidence and further perspectives. Eur. Manag. J. 18, 23–37. https://doi.org/10.1016/S0263-2373(99)00066-3.
Tahir, A.H., Umer, M., Nauman, S., Abbass, K., Song, H., 2024. Sustainable development goals and green human resource management: a comprehensive review of environmental performance. J. Environ. Manag. 370, 122495. https://doi.org/10.1016/j.jenvman.2024.122495.
Tapaninaho, R., Heikkinen, A., 2022. Value creation in circular economy business for sustainability: a stakeholder relationship perspective. Bus. Strat. Environ. 31, 2728–2740. https://doi.org/10.1002/bse.3002.
Teti, E., Andriotto, M., 2013. Effectiveness of employee welfare schemes: differences of specific professional profiles. Int. J. Hum. Resour. Manag. 24, 3232–3246. https://doi.org/10.1080/09585192.2013.763840.
Wang, M., Li, Y., Li, J., Wang, Z., 2021. Green process innovation, green product innovation and its economic performance improvement paths: a survey and structural model. J. Environ. Manag. 297, 113282. https://doi.org/10.1016/j.jenvman.2021.113282.
Warmate, Z., Eldaly, M.K., Elamer, A.A., 2020. Offering flexible working opportunities to people with mental disabilities: the missing link between sustainable development

goals and financial implications. Business Strategy and the Environment n/a 1–17. https://doi.org/10.1002/bse.2694.

Yong, J.Y., Yusliza, M.-Y., Ramayah, T., Jabbour, C.J.C., Sehnem, S., Mani, V., 2020. Pathways towards sustainability in manufacturing organizations: empirical evidence on the role of green human resource management. Bus. Strat. Environ. 29, 212–228. https://doi.org/10.1002/bse.2359.

Zaidi, S.A.H., Mirza, F.M., Hou, F., Ashraf, R.U., 2019. Addressing the sustainable development through sustainable procurement: what factors resist the implementation of sustainable procurement in Pakistan? Soc. Econ. Plann. Sci. 68, 100671. https://doi.org/10.1016/j.seps.2018.11.008.

Zeng, H., Chen, X., Xiao, X., Zhou, Z., 2017. Institutional pressures, sustainable supply chain management, and circular economy capability: empirical evidence from Chinese eco-industrial park firms. J. Clean. Prod. 155, 54–65. https://doi.org/10.1016/j.jclepro.2016.10.093.

Zhang, L., Li, D., Cao, C., Huang, S., 2018. The influence of greenwashing perception on green purchasing intentions: the mediating role of green word-of-mouth and moderating role of green concern. J. Clean. Prod. 187, 740–750. https://doi.org/10.1016/j.jclepro.2018.03.201.